DOCUMENT RESUME

ED 301 682 CE 051 440

AUTHOR Penisten, John
TITLE Developing Literacy for the Vocational-Technical Trades.
PUB DATE 7 Jul 88
NOTE 13p.; Paper presented at the World Congress of the International Reading Association (Gold Coast, Queensland, Australia, July 7, 1988).
PUB TYPE Speeches/Conference Papers (150) -- Reports - Descriptive (141)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Content Area Reading; Learning Modules; *Literacy Education; Postsecondary Education; Pretests Posttests; Program Effectiveness; *Reading Skills; *Skill Development; *Trade and Industrial Education; Two Year Colleges
IDENTIFIERS *Job Related Reading; *University of Hawaii

ABSTRACT

The University of Hawaii at Hilo offers a vocational-technical occupational reading curriculum that encourages literacy for technology. The program is geared to meet the special needs of enrollees in the university's trade and industry division, most of whom are postsecondary open-admission students. Most have poor reading skills, averaging a grade equivalent comprehension score of 9.0 or below on the Nelson-Denny Reading Test--Form E and an average of below the 50th percentile on the Industrial Reading Test--Form B. The program's typical student is underprepared to handle the rigors of technical reading, lacks motivation, and is a low achiever academically. The technical occupational reading curriculum features technical reading modules that use introductory-survey, comprehension, and problem-solving/application activities to give students practice in general reading exercises while teaching them how to read and use technical materials. Since most modules are based on specific trade-related materials, students have generally found them relevant and have thus been receptive to using them. Pre- and posttest data for those students who have taken part in the course over the past two academic years indicate gains in reading comprehension by students in carpentry/welding, machine technology, auto body repair, auto mechanics, and electricity technology. (MN)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED301682

DEVELOPING LITERACY FOR THE VOCATIONAL-TECHNICAL TRADES

John Penisten, M.S.
Reading Instructor

General Education Division
University of Hawaii at Hilo
Hilo, Hawaii USA

A Paper Presented at
the International Reading Association World Congress
Gold Coast, Queensland, Australia
July 7, 1988

CE051440

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

This document has been reproduced as received from the person or organization originating it.

Minor changes have been made to improve reproduction quality.

Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

J Penisten

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

DEVELOPING LITERACY FOR THE VOCATIONAL-TECHNICAL TRADES

A vocational-technical occupational reading curriculum that encourages literacy for technology has been the core of a reading program for trades students at the University of Hawaii at Hilo. The curriculum, featuring vocational-technical trades content modules, is designed for two-year trades students enrolled in the Hawaii Community College carpentry, automotive mechanics, auto body repair, electrical technology, welding and sheet metal, diesel mechanics, machine technology, and food service programs. The modules address the special needs of trades students in developing literacy for technology and in overcoming problems not resolved through more traditional teaching-learning methods and materials.

Problems

The students are post-secondary open-admission enrollees in the University's Trade & Industry Division. Most have poor reading skills, averaging a grade equivalent comprehension score of 9.0 or below on the Nelson-Denny Reading Test--Form E and an average of below the 50th. percentile on the Industrial Reading Test--Form B. The typical student is underprepared to handle the rigors of technical reading, lacks motivation, and is a low achiever academically.

Trades students are required to take English 051-

Occupational Reading as one of the related liberal arts courses required for graduation. The majority of the students have a negative attitude toward non-trade "academic" type courses and they see little value in or need for well-developed reading skills. They perceive Occupational Reading as an unnecessary, irrelevant course that takes valuable time away from their trade programs. Furthermore, they see no connection between an "English/Reading" class and their goal of getting a job in their trade area.

Reading Needs of Trades Students

First, vocational-technical trades students simply need to be better readers than they generally are. Their chosen fields demand it. Many are the classic "reluctant" readers and are not academically prone. They need to practice reading more in order to improve their skills to deal with the volume and complexity of the technical reading in their chosen trade area.

Trades students must comprehend technical expository material laden with technical vocabulary; be able to problem solve using complex trade-technical handbooks, manuals, and references; comprehend specification sheets, data sheets, etc.; locate and extract information from graphs, tables, charts, diagrams, etc.; translate information into solutions/answers to problems on the job/in the shop; be able to follow sequential directions or steps in a given operation or procedure; know and understand the regulations governing their respective trade and occupational field. In short, they must be able to read and

understand complex material to complete their training program and to be successful on the job afterwards.

Granted, some of these students can locate main ideas reasonably well, but many cannot draw conclusions or make inferences readily. Many are easily confused in reading and sorting out main ideas and details and are easily lost in the technical vocabulary of their trade field. Occupational reading course materials should then provide general reading experience and practice and specific skill development.

Second, in comparison to liberal arts or general studies students, trades students need to be more technologically literate. Trades students traditionally are not as academically mature or prepared as are liberal arts or general studies students. They have difficulty in handling the demands of technical reading in their respective trade area.

Technical material is often concisely and precisely worded using technical vocabulary to state difficult ideas and concepts. This is material that even the best of readers find tedious, confusing, time-consuming, and frustrating.

Third, trades students need to be able to problem solve on the job. It is expected of them. They cannot afford to rely on guessing at answers or solutions. They must be able to analyze a situation, troubleshoot and diagnose carefully, recognize what information is needed, know where to find it quickly, and apply that information in a prescribed and accepted manner.

The skill of problem solving on the job requires that students be familiar with and know how to use the standard

working references in their trade fields. Thus, a major goal of the Occupational Reading course is to make reading material that is technical and difficult for the best of readers manageable and meaningful for reluctant readers.

Modules

A series of modules in all trades areas was developed to help students learn how to manage reading technical materials as well as improve their general reading skills. These modules include activities in general comprehension, main idea and details, inferences, problem solving, critical reading, etc..

Most modules are based on existing trade related materials used in the respective trade programs. The various modules developed are composed of introductory-survey, comprehension, and problem solving/application sections. The modules provide hands-on practice in using various sections of the respective trade text or manual, related technical readings and materials, and general reading and study skill instructional materials.

When practical, the trade manual or textbook is the subject of the initial module which attempts to introduce the student to his/her trade text as a source of information. For most trades students, the textbook or manual is the basic reference they must master and represents some of the most difficult reading they will do. Some of the trade manuals used are the Uniform Building Code (carpentry), National Electrical Code (electricity), Machinery's Handbook (Machine Technology), Sheet Metal Pattern Drafting (Welding and Sheet Metal), and

Professional Cooking (Food Service).

Some general survey module topics developed for this curriculum based on trade texts or manuals currently in use are "Survey of Metallurgy--Chapter 1", "Machinists Module", "Sheet Metal Pattern Drafting--Using the Appendices", and "Survey--Professional Cooking".

Other modules are based on trade-related materials such as handouts, references, technical readings and other resources. Some of these topics are "Bend Allowances and Bend Deduction Data", "Fatigue Failure in Sheet Metal", "Food Poisoning", "Solar Hot Water Heaters", "Building Permit Application", and "Contractor's License Application".

Modules based on general reading and study skill instructional materials cover such topics as "Reading for Main Ideas", "SQ3R and Technical Reading", "Technical Vocabulary Development", "Technical Library Resources", "Textbook Underlining and Marking", etc.

Modules have a cover page that outlines the terminal objective, instructions, and materials needed. The module's multiple activity sheets are similarly labeled. It is essential that students know exactly what is expected and what they will be doing. With the inclusion of reading objectives with each activity sheet, students begin to make connections between learning to read better and learning more about their trade.

Module Activity Sheets

In the initial module for each class, students complete a

thorough introduction-survey of their trade text or manual. Students survey the book while responding to questions regarding the table of contents, chapter-unit headings, organization, layout, index contents, appendices, glossary, etc. This helps students become familiar with the general content and organization of the text or manual.

Additional activities covering an introduction to technical vocabulary are also included. These activities help students begin building competency and familiarization with related trade terminology. For machinists or welders these activities might cover words like "tensile strength" , "lap seam", "annealed", and "viscosity". For food service students, such words as "braise", "fricassee", "saute", and "temper" are common. Other trades use similar related terminology. Students can write a definition or draw a sketch of the term to demonstrate usage and understanding.

Module comprehension activities are designed to improve students ability to read and understand technical material. Here the emphasis is on using the trade text or manual to read sections and answer general comprehension questions by locating specific information.

The process involves identifying a key word in the question, looking for a citation in the index, finding the appropriate page and section, and then locating the answer to the question. The student must use the skills of locating and identifying information and reading for main ideas and details to locate the answer.

The following is an example taken from a welding and sheet

metal module, "Bend Allowance and Bend Deduction Data": "What happens to the Neutral Axis when the Elastic Limit is exceeded?" The student looks up "Neutral Axis" in the index and/or locates it in the appropriate module section, reads the section on Neutral Axis, and answers the question. The module states that "when the Elastic Limit is exceeded, the Neutral Axis moves from the center of the metal toward the inside of the bend." This process allows students to learn to use trade texts, manuals, and related materials to locate information and to read and understand technical information better.

Problem solving activities are organized around word problems that simulate on-the-job situations as well as theoretical applications. The student goes through a four step problem solving process. First, the student identifies the problem and what information is needed; second, the student locates the information necessary to solve the problem; third, the student reads the information and applies it to the problem; fourth, the student determines the appropriate solution, given the problem and circumstances.

As an example, an electricity technology module based on the National Electrical Code 1987 (handbook for electricity students) includes the following problem: Article 210-52 of the NEC 1987 handbook covers installation of Dwelling Unit Receptacle Outlets. You are installing the wiring for a dwelling. The family room has walls 18 x 12 x 18 x 4 feet with eight foot sliding doors next to the four foot section. How many receptacles should be installed? What is the purpose of the code regulation in this

section?

To solve the problem, the student needs to be familiar with the specific code article/section concerned. The student consults the NEC 1987 handbook and proceeds with the four-step process noted above in finding the appropriate information on the number of repectacles to install.

According to the code (Article 210-52 (a) page 70-39/40), "...receptacle outlets shall be installed so that no point along the floor line in any wall space is more than 6 feet (1.83 m), measured horizontally, from an outlet in that space, including any wall space 2 feet (610 mm) or more in width and the wall space occupied by sliding panels in exterior walls."

After drawing a rough diagram and making calculations based on code information given, the student should arrive at the correct solution: five receptacles should be installed. Furthermore, the article states that the purpose of this requirement is to minimize the use of cords across doorways, fireplaces, and similar openings.

The length, use, and content of modules varies by trade class and group composition. Most modules are short term projects ranging from an hour to several hours of work time. Module activities are either instructor or student corrected depending on the individual class situation. Modules can be used in both small and large group instruction, individualized instruction, in a regular classroom or in a learning center.

Summary

Technical reading modules utilizing introductory-survey, comprehension, and problem-solving/application activities are an effective method of providing trades students practice in general reading exercises as well as teaching them how to read and use technical materials. Since most modules are based on specific trade related material, reading becomes relevant to the students. They are more likely to attend to the task at hand--reading technical material--and develop positive attitudes in the process. Developing literacy for the vocational-technical trades where there was little previously is the program's desired outcome.

TABLE 1

This table provides pre- and post-test data for the past two academic years using results from the Industrial Reading Test-Form B (1977) as the entry-exit assessment instrument. The Industrial Reading Test is the most compatible instrument found in that it reflects general reading and technology-oriented content similar to the course content utilized in the modularized program. The one exception is Food Service, where the Test of Adult Basic Education was adopted to reflect more closely the content of that course for spring, 1988. The tabulated results by group/semester and percentile averages are as follows:

Fall, 1986	Spring, 1987
Carpentry-Welding: n = 18	Food Service: n = 12
Pre-test: 40.2 percentile Post-test: 49.7 percentile	Pre-test: 31.7 percentile Post-test: 31.0 percentile
Fall, 1987	
Machine Technology: n = 4	Carpentry-Welding: n = 13
Pre-test: 37.5 percentile Post-test: 53.7 percentile	Pre-test: 36.5 percentile Post-test: 48.8 percentile
Auto Body Repair: n = 11	Auto Mechanics: n = 16
Pre-test: 18.0 percentile Post-test: 22.7 percentile	Pre-test: 27.1 percentile Post-test: 45.9 percentile
Spring, 1988	
Electricity Technology: n=13	Food Service: n = 11
Pre-test: 56.5 percentile Post-test: 64.9 percentile	Pre-test (TABE): 10.8 grade Post-test (TABE):10.6 grade

REFERENCES

DAUGHERTY, J.S., POWELL, R.E., & FOSTER, H.L. (1975). Sheet metal pattern drafting and shop problems. Encino, California: Glencoe Publishing Company.

GISSLEN, WAYNE. (1983). Professional cooking. New York: John Wiley & Sons, Inc.

Industrial Reading Test, Form B (1977). San Diego, California: The Psychological Corporation.

National electrical code handbook (1987). Quincy, Mass.: National Fire Protection Association.

Nelson-Denny Reading Test, Form E (1981). Boston: Houghton Mifflin Company.

O'BERG, E., JONES, H., & HORTON, H.L. (1984). Machinery's handbook. New York: Industrial Press Inc.

Test of Adult Basic Education, Form D-6 (1987). Monterey, California: CTB/McGraw-Hill

Uniform building code standards (1982). Whittier, California: International Conference of Building Officials.